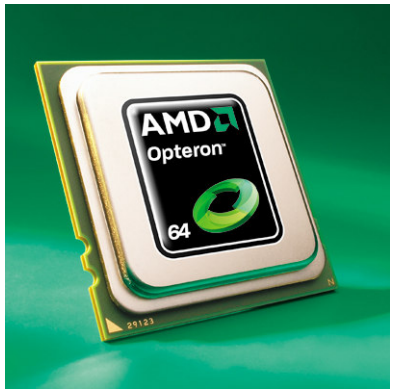
Quad-Core AMD Opteron™ Processor Fact Sheet



AMD introduces the Quad-Core AMD Opteron™ processor, the world's most advanced x86 processor ever designed and manufactured and the first native x86 quad-core microprocessor. Designed from inception for the most demanding datacenters, Quad-Core AMD Opteron processor-based servers from global OEMs and system builders can deliver breakthrough capabilities to customers in a time of dramatically escalating emphasis on performance-per-watt.

Features At-A-Glance

Quad-Core AMD Opteron processors with AMD's revolutionary Direct Connect Architecture introduce innovations that go beyond four x86 processing cores on a single die of silicon. Critical considerations for today's demanding business requirements inspired interrelated Quad-Core AMD Opteron processor innovations: energy efficiency, enhanced virtualization performance, and investment protection via a customer-centric approach of enabling a non-disruptive transition from dual- to quad-core within the same power and thermal envelopes to keep infrastructure costs down.

AMD CoolCore™ Technology is designed to turn off portions of the processor logic and memory controller when not in use and reduce processor energy consumption and heat generation.

Dual Dynamic Power Management offers separate power planes for cores and memory controller for optimum performance with reduced power consumption.

Independent Dynamic Core Technology allows each core's utilization to be controlled separately based on workload, maintaining performance while helping reduce power consumption.

AMD Memory Optimizer Technology is designed for the increased demands of quad-core processors. This memory controller enhancement increases memory throughput by up to 50 percent compared to previous generations of AMD Opteron processors, for improved multi-threaded application performance.

AMD Wide Floating Point Accelerator provides 128-bit SSE floating point capabilities, which enable each processor to simultaneously execute up to four FLOPs per clock (four times the floating-point computations of previous AMD Opteron processors) for significantly improved performance in compute-intensive and workstation applications.

AMD Balanced Smart Cache offers a mix of dedicated and shared cache designed to optimize multi-threaded application performance, and realize the full potential of quad-core processors.

AMD Virtualization™ technology with Rapid Virtualization Indexing (formerly Nested Paging) is designed to accelerate the performance of many virtualized applications by performing memory management in hardware that previously required Hypervisor software intervention. Rapid Virtualization Indexing enables moving the process of virtual to physical address translation from software directly into the hardware, reducing the complexity of existing x86 virtualization solutions for increased performance and efficiency for many virtual workloads, and allowing for a higher performing, more flexible IT environment.

In addition, AMD's "tagged" TLBs (Translation Look-aside Buffers) help improve system performance when switching between multiple virtual machines while the DEV (device exclusion vector) allows security checks to take place in hardware for greater efficiency.

AMD
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DID YOU KNOW?

- Engineering work on Quad-Core AMD Opteron processors began in Q3 of 2004.
- The design of the Quad-Core AMD Opteron processor was a global effort led by the design team in Austin, Texas with major contributions from AMD's India Design Center as well as designers in Sunnyvale, California.
- Approximately 400 engineers and 1.5 million man-hours went into the design of Quad-Core AMD Opteron processors.
- The Quad-Core AMD Opteron processor was a company-wide initiative that involved thousands of employees around the globe. Vital production efforts took place in:
  - Manufacturing: Fab 36 in Dresden, Germany, where all AMD Opteron processors will be manufactured
  - Test, Mark and Pack: Singapore
  - Assembly: Penang, Malaysia
- One Quad-Core AMD Opteron processor has approximately 463 million transistors in current logic and a total of more than 600 million physically on the die.
- The first Quad-Core AMD Opteron processors will be produced with AMD's fourth generation, most advanced 65nm process, which includes the latest strained silicon engineering to act as a key enabler of improved performance-per-watt. Specific process technologies include:
  - Silicon-on-insulator (SOI) process lowers power consumption and improves performance
  - Dual-stress liner (DSL) technology increases transistor performance, while controlling power consumption and heat dissipation
  - Embedded silicon germanium (e-SiGe) delivers a 40 percent potential increase in transistor performance, reduced power consumption and heat dissipation, and high product yields
- Depending on workload, it would take five original Single-Core AMD Opteron processors to equal the performance of one Quad-Core AMD Opteron processor.
- The die size of one Quad-Core AMD Opteron processor is 285 mm^2.

Quad-Core AMD Opteron Processor is the world's first...

- Native x86 quad-core processor
- x86 processor with tri-level memory cache hierarchy with fully shared L3 cache for all four cores
- x86 processor with Nested Page Table support for improved virtualization performance
- x86 processor with a floating point unit (FPU) with 2x128-bit loads/cycle

Model Number	Core Frequency	DDPM N. Bridge Freq	ACP	L2 Cache Size	L2 Cache Speed	L3 Cache Size	Manuf. Tech	Memory Speed	HyperTransport™ Speed[1]	Socket
8350	2.0	1.8	75W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
8347	1.9	1.6	75W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
8347 HE	1.9	1.6	55W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
8346 HE	1.8	1.6	55W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
2350	2.0	1.8	75W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
2347	1.9	1.6	75W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
2347 HE	1.9	1.6	55W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
2346 HE	1.8	1.6	55W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)
2344 HE	1.7	1.4	55W	4x512K	At Core Freq.	2M	SOI 65nm	Up to DDR2-667	2000MT/s	F (1207)

[1] 2000MT/s @1000MHz HyperTransport Technology Speed